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November 25, 2009

**VIA ECFS**

Marlene H. Dortch  
Secretary  
Federal Communications Commission  
The Portals  
445 - 12th Street, SW  
Washington, DC 20554

Re: *International Comparison and Consumer Survey Requirements in the Broadband Data Improvement Act, GN Docket No. 09-47; A National Broadband Plan for our Future, GN Docket 09-51; Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act, A National Broadband Plan for Our Future, GN Docket No. 09-137*

Dear Ms. Dortch:

On behalf of Hiawatha Broadband Communications, Inc. ("HBC"), I am filing the attached White Papers in the above mentioned dockets in response to questions from the staff of the Federal Communications Commission working on the National Broadband Plan. The three White Papers (the first two of which were generated by HBC and the third by the Fiber-to-the-Home Council) contain proposals to address key problems faced by wireline providers in rural areas seeking to deploy advanced broadband networks, principally fiber-to-the-home networks:

1. *Capital Market Access – Use of the Federal Communications Commission's Universal Service Fund to Establish a Debt Service Reserve Replenishment Credit Enhancement Program.* The establishment of a debt service reserve replenishment fund backed by universal service funding would address a crucial problem faced by rural broadband providers in obtaining access to debt financing at reasonable rates. Rather than simply

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providing capital grants or loans to construct networks, such a program seeks to leverage, and thereby maximize the value of, universal service funding to develop broadband infrastructure in unserved and underserved areas. This credit enhancement program also is superior in other aspects to a grant or loan program in that it:

- Does not require any cash outlay or deposit to the project to provide for market access;
- Will provide a “stand by” enhancement which is dependent on the successful operations of the project;
- Will require minimal administration or project oversight until such time that a draw is required; and
- Will utilize private sector capital for construction and permanent financing.

Finally, as a result of the market access made available by the program, debt and equity capital should become available.

2. *Easing the Transport Burden.* The Commission has received considerable evidence in these proceedings to demonstrate that rural broadband providers often pay excessively high prices for transport to internet nodes because of a lack or shortage of middle mile facilities. To remedy this problem, the Commission should use universal service funding to create a general broadband fund, and, as part of that fund, establish a capital grant program for the development of points-of-presence (“huts”) in rural areas. Local service and transport providers – potentially in partnership with communities -- would join to apply for support under the proposed program. The total cost of the program would be approximately \$50 million, assuming the construction of a total of 2000 new huts with a subsidy of \$25,000 per hut. This cost, of course, could be spread over a number of years, reducing the annual outlay from the fund. In addition to the deployment of points-of-presences, transport providers participating in the program would agree to price carriage on a per service basis.


3. *Broadband Training Initiative.* Acceleration of the spread of successful fiber-optics network facilities throughout the country will require support for training for implementation and operation of fiber optics networks. A training initiative should include (1) identification of best practices training, and (2) establishment of a certification training program which could be set up in cooperation with the Fiber-to-the-Home Council for implementation at industry meetings or other appropriate training venues. The Council has developed a plan for establishment of a certification training program based on its view of best practices training, and it is ready to act as an industry partner lending information and development support to any government agency, particularly as a way to enhance the job retention and creation.

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Should you wish to discuss the presentations further, please contact me.

Sincerely,



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*Counsel for Hiawatha Broadband  
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Attachments:

1. *Capital Market Access – Use of the Federal Communications Commission's Universal Service Fund to Establish a Debt Service Reserve Replenishment Credit Enhancement Program*
2. *Easing the Transport Burden*
3. *Broadband Training Initiative*

cc: Blair Levin  
Erik Garr  
Steve Rosenberg

**Hiawatha Broadband Communications, Inc.**

**White Paper: Broadband Development in Rural America**

**Capital Market Access**

**Use of the Federal Communications Commission's  
Universal Service Fund to Establish a Debt Service Reserve Fund  
Replenishment Credit Enhancement Loan Program**

**INTRODUCTION**

A prime objective of the National Broadband Plan is to ensure that unserved and underserved areas in the United States are not left behind and have access to the same broadband services available in served markets. There are problems with achieving this goal, including being able to access capital at reasonable rates for these projects of greater financial risk. Quite frankly, building broadband in unserved and underserved areas presents a financial challenge, with the return often being insufficient to attract both equity and debt investors. This challenge has become greater in the current economic downturn. As has been documented, the debt markets have been in an increasingly severe credit and liquidity crisis since mid-2007. This crisis afflicting the capital markets in the past two years has played havoc with capital access plans of many for-profit and not-for-profit organizations looking to finance various badly needed communications infrastructure projects. Yet, for the United States to completely and efficiently build-out critical broadband facilities, there must be immediate and ready access to capital.

The federal government has used and is using two key policy mechanisms to address the financial gap in high-cost or rural areas (which in many instances are synonymous with unserved and underserved areas): the low-interest loan or loan guarantee programs at the Rural Utilities Service, and the FCC's "High-Cost Universal Service Fund" operating subsidy program. While these programs are valuable, they have proven to be insufficient to accelerate the deployment of adequate broadband infrastructure in these areas. In particular, it is far from certain that providing regular operating subsidies will result in deployment of sufficient long-term infrastructure, even if the funds are linked to specific broadband performance. Direct capital grants (with minimal matching funds) could bridge this gap, but such a mechanism is expensive and often inefficient – and should be employed in only the most unserved areas. Rather, for most unserved and underserved areas, the government should create policies that are effective and maximize its leverage. The discussion that follows sets forth a policy proposal for what we believe to be an efficient and immediately available program which will provide for the level of credit enhancement necessary. The program will allow both for-profit and not-for-profit broadband projects to access the necessary debt capital to move forward quickly and

efficiently. Once debt capital becomes available, the opportunities for equity investment increase concomitantly.

## **DEBT SERVICE RESERVE FUND REPLENISHMENT CREDIT ENHANCEMENT LOAN PROGRAM**

### **PROGRAM OBJECTIVES**

The objectives of the program are to:

- Define a program whereby developers of broadband (especially “future proof” fiber-to-the-premises) projects can obtain credit enhancement for debt financings to support individual project developments throughout unserved and underserved areas in the United States.
- Utilize the existing infrastructure/programs of the Federal Communications Commission and its funding mechanisms to employ such a credit enhancement program, without the creation of an entirely new bureaucratic infrastructure system to deploy this program.
- Establish a definitive funding amount (dollar amount) which can be identified for exclusive use by this program without further appropriation or allocation from Congress and/or any other Federal Communications Commission program.
- Define a system of credit enhancement which provides the maximum amount of leverage using the private sector investment resources in order to provide the debt capital for the necessary programs.
- Develop and provide a system of credit enhancement which is established on a “revolving fund” basis whereby the individual program participants will reimburse the program for any draw on a credit enhancement that use the Federal Communications – Universal Service Fund dollars.
- Provide a credit enhancement program which not only allows for the immediate access of a number of programs to gain the level of debt capital necessary for projects to move forward quickly, but also which is simple in its design and execution, providing that the process is one which can move forward quickly.

This credit enhancement program is in many ways, far superior to a grant or loan program in that the Reserve Fund Replenishment Program:

- Does not require any cash outlay or deposit to the project to provide for market access.
- Will provide a “stand by” enhancement which is dependent on the successful operations of the project.

- Will require minimal administration or project oversight until such time that a draw is required.
- Will utilize private sector capital for construction and permanent financing. Equity and debt capital will become available as a result of the market access made available by the Program.

## **FUNDING SOURCE**

The Universal Service Fund, provided under the auspices of the Federal Communications Commission, is the targeted or identified funding source for this program. It is intended that a specific allocation of dollars (\$1 billion is the proposed amount for the Program on a fully implemented and mature basis) will be set-aside from the Universal Service Fund for this Debt Service Reserve Fund Replenishment Enhancement Loan Program. The total amount does not need to be made available in its entirety up front but can be built over a number of years, *e.g.* adding \$200 million per year for five years. This funding could be made available by making the existing funds more efficient.

As a starting point, the Commission may want to consider a “Pilot Program” which puts \$100-\$200 million into the market to test the market acceptance, perfect the process mechanics and show the great value of leverage.

## **Debt Service Reserve Fund – Project Specific**

For each loan backed by the government, the Debt Service Reserve Fund (DSRF) will include an amount approximately equal to one year’s principal and interest payment or annual debt service of the loan.

The DSRF is held by a Trustee (chosen by the FCC) on behalf of the lender. Fund proceeds can be invested in predetermined eligible investments. Typically, these investments are US Treasury Securities, Agencies or collateralized guaranteed investor contracts.

The documents for the loan will call for the DSRF to be funded at a required level throughout the term of the loan. Language in the loan documentation typically will provide for a period of “cure” in the event that the DSRF is ever drawn in order to make prompt and timely payment to the lender. This “cure” or replenishment typically comes from the cash flow produced by the enterprise being financed or is allowed from alternative and outside sources in order to meet the minimum requirement of the deposit to the DSRF.

The use of the proceeds from the DSRF are restricted to: a draw from the Trustee to make up any shortfall in the debt service when due, to partially fund a complete redemption of the loan at either a mandatory or optional redemption event, or to make a portion of the final payment on the loan at the term date.

Typical term sheet language for a DSRF is as follows:

**Debt Service Reserve Fund:** A DSRF will be created and funded from the Borrower's cash, loan proceeds, and/or a letter of credit arranged by the Borrower and acceptable to the Managing Underwriter in an amount equal to the maximum one-year principal and interest debt service on the Loan. The DSRF will be held by the Trustee for the Term of the Loan for the benefit of the Lender. The DSRF will be invested by the Trustee at the direction of and for the benefit of the Borrower.

#### **Debt Service Reserve Fund Replenishment**

A DSRF replenishment provision can be made a part of the structure of a loan, and consequently, can provide a very significant opportunity for enhancement of the credit of the loan which is offered to the marketplace. This replenishment provision will be the subject of an agreement between the Universal Service Fund (the "Fund") and the Loan Trustee (the "DSRF Replenishment Agreement"). This DSRF Replenishment Agreement will provide for the make-up of any shortfall from the maximum requirement for the DSRF created by a draw by the Trustee.

#### **Replenishment Loan Repayment**

The Fund, as a result of the DSRF Replenishment Agreement, will receive a subordinate note from the Project, and as a result, be reimbursed for draws which they are required to cover from the DSRF. For example, the Fund, having negotiated terms to the DSRF Replenishment Agreement, will be secured on a subordinate basis (subordinate to the lender).

During the term of the DSRF Replenishment Agreement, the Loan will carry a provision whereby the lender will agree not to accelerate the Loan. Consequently, the obligation of the Fund for replenishment will be limited to the amount of the DSRF for any given year. This maximum amount assumes, of course, that there are no revenues to pay debt service for that period from the Project.

#### **CAP-Limitation – Project Specific**

The DSRF Replenishment Agreement will be capped and thus limited to a dollar amount in the aggregate. For the purpose of this discussion, this limit for the entire Fund is to be \$1,000,000,000. This cap/limitation is, on a project to project basis, sized to represent approximately two (2) full years of principal and interest on the Loan ("Debt Service"). In order for the exposure of the Fund to reach this level, any given Project would have to fail to generate any revenue available for Debt Service for a sustained 24 months past construction build-out and capitalized interest.

Term sheet language in regards to a DSRF Replenishment Agreement as described herein would read as follows:

**Debt Service Reserve  
Fund Replenishment  
Agreement:**

The Universal Service Fund (the "Fund") will provide a DSRF Replenishment Agreement, whereby the Trustee will be instructed to draw on the DSRF in the event of a shortfall in revenue from the Project. A draw from the DSRF will be replenished up to an aggregate maximum of \$(Project Specific) until such time that the requirement for the Release of the Replenishment Agreement has been satisfied (see Release Provisions below). An individual draw on the DSRF will cause a draw from the Replenishment Agreement to be deposited into the DSRF within 60 days from the initial shortfall and draw. For as long as the DSRF Replenishment Agreement is in place, the Loan documents will provide that the Loan will not be subject to acceleration for any reason other than a complete mandatory or optional redemption as provided for by the Loan documents.

**Release Provisions – Project Specific**

The Fund shall be afforded release provisions in the DSRF Replenishment Agreement. Under such provisions, the Fund would be released from its requirement to provide the replenishment payments.

Release provisions will be determined by a debt service coverage test over a period of time, typically through Project stabilization.

Term Sheet language, relative to the Replenishment Agreement Release Provisions, would typically read as follows:

**Replenishment Agreement  
Release Provisions:**

The Fund's obligation under the referenced DSRF Replenishment Agreement shall be released upon the Project's debt service coverage performance at 1.50x for a consecutive 18 months as determined by the annual audit of the Project.

**MECHANICS OF IMPLEMENTATION**

In order to implement such a program on a nationwide basis, the Universal Service Fund initially needs to set program criteria for projects in unserved and underserved areas. These criteria could simply be focused on: geography, size of project, market feasibility



and scale of project (developed on the basis of success criteria), financial forecast and typical due diligence requirements for project finance lending. With the criteria established, a mechanism of reasonable application standards would need to be developed through a system of review and project acceptance.

Access to the credit enhancement program, and consequently, an identification of a specific portion of the Reserve Fund Replenishment being designed to a specific project, would then allow for that project to move forward to the capital markets with the "fund" back-up or credit enhancement.

The detail of the administration and process mechanics of the implementation of the Program is beyond the scope of this white paper. We stand ready to work with the Commission to assist in this regard.

### **SUMMARY:**

In summary, the Debt Service Reserve Fund Replenishment Guarantee Program provided by the Universal Service Fund will immediately effect the development of broadband programs in unserved and underserved areas around the country. The capital markets view the most difficult period of risk as the design, build and stabilization of these projects. There is broad and deep capital market interest in broadband communications projects to the more rural parts of the country, but not without support on the credit side from a source other than their own capital for the development of new projects.

Consequently, the program outlined in this white paper is one whereby for a very minimal cost to the Universal Service Fund, and perhaps no cost at all over the long term, broadband and fiber-to-the-user projects can immediately go forward to project development and implementation for the more rural constituents in America.

November 2009

## **Hiawatha Broadband Communications, Inc.**

### **White Paper: Broadband Development in Rural America**

#### **Easing the Transport Burden**

##### **The Problem: Excessive Transport Prices in Rural Areas Deter Broadband Access**

Service providers in rural America are at a severe disadvantage when it comes to the cost of broadband transport. While fiber transport companies often have available fiber passing through or near rural communities, few network points of presence (POPs) have been created in rural areas. As a result, thousands of small towns are 50 miles or more from a network POP. Connecting these small towns to a network POP is possible usually only through the telephone local exchange carrier (LEC), and in many cases two or more telephone companies may be required to make the necessary connections to complete a transport link to a POP. This is known as the loop cost. The loop cost of a simple DS3 in a rural area could easily run more than \$5,000 per month compared to a more typical \$550 in a metropolitan area nearer a POP.

Reducing transport costs would encourage more rural last-mile services at affordable costs, but transport companies have not responded to the need because linking into a fiber route typically costs \$100,000 to provide a hut with appropriate electronic equipment and power. Recovering this expenditure drives up cost to service providers and makes last-mile service expensive.

##### **The Solution: Local Service-Transport Provider Partnerships with Community Engagement**

Incentives are needed to encourage middle-mile transport companies to locate huts at strategic points amid clusters of communities. These huts could be used by neighboring communities and eliminate the need for multiple-loop providers. Among transport companies that have studied this problem, a cost figure of \$100,000 is often given as a true cost for hut access. Discussions with rural service providers say that while they can meet 75 to 80 percent of the cost of access, the final 20 to 25 percent results in business plan negatives that most frequently sideline planned projects. A program aimed at covering the 20 to 25 percent gap in relevant secondary or tertiary markets would be a valuable incentive that would broadly enable increased access for last-mile customers. Extensive and candid discussions with middle-mile transport companies suggest the problem can be solved if they can team with local, rural service providers – and potentially a community (or group of communities) -- to obtain government funds to fill the gap of paying for the cost of hut access.

The federal government logically is the source of last resort for incentives or subsidies to local projects and transport companies to assist with the significant start-up costs. It would initiate a program with the following objectives:

- Establish a mechanism that incents middle-mile broadband transport companies to open their fiber infrastructure to service providers in rural areas of the nation.
- Develop a grant program to support construction of strategically placed POPs in rural areas.
- Maximize use of these POPs by locating them in places where clusters of small communities can construct modest fiber runs to connect to them.
- As a condition to obtaining the subsidy, middle-mile transport companies would implement a pricing model based on the number of services in a last-mile project.

Local service and transport providers – potentially in partnership with communities -- would join to apply for support under the proposed program. Capital grants would come from a Broadband Fund created from the current high-cost support mechanism in the universal service fund and would be used to put POPs into place in these communities. The total cost of the program would be approximately \$50 million, assuming the construction of a total of 2000 new huts with a subsidy of \$25,000 per hut. This cost, of course, could be spread over a number of years, reducing the annual outlay.

In exchange for the subsidy and gaining transport business, transport companies will commit to using a pricing model developed by Hiawatha Broadband Communications, Inc., in southeastern Minnesota. HBC charges its rural wholesale customers on a per-service basis for use of its facilities, including head-end and bandwidth. Per-service charges allow the provider to build revenues in new territories without the burden of financing all of the start-up costs. Payments accelerate as customer numbers surpass plateaus negotiated in advance. When customer numbers reach the top plateau, the balance of the start-up costs and financing fees become due.

This model allows providers to build business cases that support last-mile extensions to more rural areas, as well as promoting a three-way benefit. Last-mile users, service providers, and transport companies all become beneficiaries of the program.

November 2009

## **Fiber-to-the-Home Council**

### **White Paper**

#### **Broadband Development in Rural America**

#### **Technical Training Program**

### **Establishment of a Certification Training Program for Implementation and Operation of Fiber-Optics Networks**

#### **Summary**

Acceleration of the spread of successful fiber-optics network facilities throughout the country will require support for training for implementation and operation of fiber optics networks. The Fiber-to-the-Home Council suggests that a training initiative include (1) identification of best practices training, and (2) establishment of a certification training program which could be set up in cooperation with the Council for implementation at industry meetings or other appropriate training venues.

The FTTH Council has developed a plan for establishment of a certification training program based on its view of best practices training. An outline of that plan is attached and the Council is ready to discuss that more fully. In addition, the FTTH Council is ready to act as an industry partner lending information and development support to any government agency, particularly as a way to enhance the job retention and creation.

#### **Introduction**

As the National Broadband Plan is shaped, seeking to ensure that there is coverage across America, the construction of networks should be just one piece of the connectivity puzzle addressed by the authors. Equally as important as the development of broadband infrastructure is the successful operation of the new networks.

Key to the success is the understanding and expertise of the people who operate and maintain the new networks. While standards and training programs exist for providers who deliver content by copper, coax and hybrid fiber-coax, no such programs exist for those who deliver content via fiber-to-the-home networks. The FTTH Council has developed a plan to establish a certification training program, the outline of which is attached. Should the government view such a program as consistent with its efforts (1) to accelerate the deployment of fiber-based broadband infrastructure and (2) foster job retention and creation, there is the potential to enhance the program's operations by joining with Department of Labor or other federal or state government agency. For instance, the Employment and Training Administration established in the American Recovery and Reinvestment Act of 2009 – Health Care Sector and other High Growth and

Emerging Industries (SGA/DFA PY 09-01) could serve as a model for a certification training program.

### **Program Objectives**

The objectives of the program are to:

- Identify best practices in the area of training for next-generation (fiber-to-the-home) networks.
- Establish a certification training program which is set up in cooperation with the Fiber to the Home Council for implementation at industry meetings or other appropriate training venues.
- Designate a pool of funds to support training programs through appropriate entities.

### **Certification Training Program Specifics**

The certification training program would eliminate the current primary training challenges for operators, particularly smaller and more rural operators, including employees' knowledge of the optical domain, the use of multiple wavelengths, and physical and technical skills needed for fiber splicing and management. The old model of contractor fiber splicing doesn't work well in the FTTH environment, at least outside main plant construction. Every new drop line must be spliced, tested, and provisioned, these operations often occurring during conditions that are unfavorable. Even with new connectors, special skills are required.

A training initiative should embrace two steps. The first step would be to support a program to accelerate identification of best-practices training for fiber implementation, operations, and management. Such a program might take some lessons from both telecommunications institutes and from industry groups also committed to quality training. For example, the National Regulatory Research Institute (NRRI) focuses on creating the knowledge to meet regulatory challenges (among other goals). There is a similar need to rapidly identify best practices for training to meet the fiber implementation challenge. In this step a small but focused challenge program set up in cooperation with the industry associations and university centers would aim to provide rapid results identifying best practices for training and management.

The second step would be to create something like a Fiber Training Institute (FTI). A rough analogy might be made to the work of the United States Telecommunications Training Institute (USTTI), which is a non-profit public-private partnership between senior federal officials and leaders of the U.S. information and communication technology (ICT) and broadcast industries focusing on development and training for the developing world. The purpose of a Fiber Training Institute would be very different with a focus on cutting-edge development and training for U.S. fiber implementations and operations committed to big broadband to the home. The actual training sites might emulate the practice of the USTTI which takes place in corporate and federal training facilities, laboratories and universities. A lean, decentralized highly effective concrete training program developed and administered by the FTTH Council is envisioned.

## **Addendum:**

### **Certified Fiber to the Home Professional CFHP**

**Goal:** Develop a certification level that will be sponsored and administered by the FTTH Council and would serve to recognize and certify FTTH system competence. The initial certification level introduced by the FTTH Council would be the professional certification level (Certified Fiber to the Home Professional – CFHP). If this certification level is successfully introduced and received, a second level designating a technician’s competency level (Certified Fiber to the Home Technician – CFHT) could be developed and introduced.

**Background:** The FTTH Council has come to represent a cross section of manufacturers, service suppliers and users interested in FTTH deployment. Additionally, it has gained recognition by government as the primary advocate for broadband fiber deployment directly to the home user. Because of the success of the FTTH Council, a certification program developed and administered by the Council would:

- Serve as a method for the FTTH Council to further its mission of increasing FTTH deployment levels
- Give credence to those wishing to design fiber to the home deployment systems
- Serve as a continuing source of revenue to the FTTH Council, potentially defraying some of the cost currently incurred by member organizations.

**Program Description:** The Certified Fiber to the Home Professional program (CFHP) would be a certification program sponsored and operated by the Fiber-to-the-Home (FTTH) Council. Certification at the CFHP level would indicate a professional level of technical competence in Fiber-to-the-Home technologies. Certification would consist of study of FTTH architecture and deployment technology necessary to design and administer an FTTH network. It would not be intended to certify competency in a particular vendor’s equipment, but, rather, to certify competence in overall FTTH theory, terminology, topology, equipment and system cost estimation.

### **Target Audience**

We envision three key targets for the certification program:

1. Existing employees of telecommunications service providers and staff at municipal operators already operating FTTH networks.

Typical job titles of those primarily benefiting from CFHP registration would include the following:

- The Fiber-to-the-Home Technical Support Manager

- The Fiber-to-the-Home Technical Support Administrator
  - The Fiber-to-the-Home Design Specialist
  - The Fiber-to-the-Home Telephony Engineer
  - The Fiber-to-the-Home Telephony Administrator
  - The Fiber-to-the-Home CATV/IPTV Engineer
  - The Fiber-to-the-Home CATV/IPTV Administrator
  - The Fiber-to-the-Home Advanced Network Engineer
  - The Fiber to the Home Network Administrator
2. Employees of existing telecommunications operators without FTTH experience interested in improving their skills so they can prepare for the shift from legacy copper based technologies to FTTH.

Individuals with little or no experience in telecommunications who are participating in or graduating from community and technical college programs in telecommunications, such as the Associate Degree in Telecommunications offered at Des Moines Community College. There may also be an opportunity for leveraging job training programs offered by other entities for positions that do not require an associate degree.

Objectives of the program would include being able to explain or demonstrate the following:

- Applications for FTTH
- Cable Preparation Issues
- Cable Types (Loose Tube, Tight Buffer, Ribbon)
- Closures (Patch, Splice, Distribution)
- Connector end preparation (APC/UPC)
- Design issues (light sources, detectors)
- Fiber types & Performance - (SMF, MMF, BIF)
- FTTH jargon
- Grounding, Purpose, Methods, Effects
- Installation requirements and methods
- LAN Topology
- Link Loss Budget
- Network Connectors (SC/LC Small Form Factor)

Operations Support Software
- Passive and Active Optical Networks
- Power Ratios
- Safety issues
- Splicing
- Splitters
- Standards involved (TIA, IEEE etc.)
- Static Forces, Protection and Detection
- System Architectures (Pt-to-PT, PON, WDM)
- Temperature Operation issues
- Test Equipment (OTDR's, Power Meters etc.)
- Testing issues

**Measurable Objectives:** Those successfully achieving the CFHP designation would have demonstrated knowledge of the covered subjects through an online examination with a passing percentage of 70% or greater.

The training course and the exam would be two separate events involving separate companies and costs. Since it should be possible for those who feel they already know the material and wish to only pursue the certification designation to take the on-line exam. Training courses would initially be administered/conducted at quarterly FTTH Council meetings and at the yearly Fiber-to-the-Home Conference & Expo. The goal, however, is to certify the curriculum of third party independent training programs administered by training companies, vendors and educational institutions. Examinations would be conducted on the FTTH Council's website, and the database of certified professionals would be maintained by the FTTH Council. A library of exam questions and answers would be developed in conjunction with training organizations and institutions that wish to provide CFHP training courses. The Council would add the exam capability to the website.

**Draft Course Outline and Topics to be covered by Exam Questions:**

#### **FTTH – CFHP Draft Course Outline**

**Target Audience:** Network design and operation personnel.



Topics covered in a training course would be the following:

1. Drivers behind FTTH
2. Factors affecting bandwidth demand
  - 2.1 Video systems
  - 2.2 Interactive technologies
3. Basic economics regarding FTTH deployments
  - 3.1. Who's implementing FTTH?
4. Review of standards.
  - 4.1. ITU-T G.983 (BPON)
  - 4.2. ITU-T G.984 (GPON)
  - 4.3. IEEE 802.3ah
  - 4.4. TIA 568, 569 and 758
  - 4.5. The NEC and NESC
5. Introduction to the point-to-point and PON physical architectures
6. Introduction to network components
  - 6.1. Active components
  - 6.2. Passive components
7. Electronic equipment overview.
  - 7.1. Sources and detectors used in FTTx equipment
  - 7.2. Passive devices used in FTTx networks
  - 7.3. The optical line terminal (OLT)
  - 7.4. The optical network terminal ONT
  - 7.5. Active Ethernet hubs and switches
8. Optical system budget
  - 8.1. Active component classifications
  - 8.2. Passive component attenuation specifications
  - 8.3. Fiber and wavelength designations
9. Cost introduction to point-to-point (Active Ethernet) versus PON
  - 9.1. Technology introduction and cost comparison
  - 9.2. Migration path considerations
10. The physical architecture
  - 10.1. Topologies
  - 10.2. FTTH versus FTTB considerations
11. Cable management products

- 11.1. Fiber distribution hubs
  - 11.2. Pedestals
  - 11.3. Splice closures
  - 11.4. Cabinets
- 12. Optical budget
  - 12.1. Triple play network characteristics
  - 12.2. Costs
- 13. Video RF versus IPTV
  - 13.1. System requirements
  - 13.2. Compression techniques (MPEG 2, 4, HDTV, Standard)
  - 13.3. DTR/DVR and Channel Change Times
  - 13.4. RFOG & Return Paths
- 14. VOIP options
- 15. Designing a network
  - 15.1. Active versus passive
  - 15.2. Protocol
  - 15.3. Classification
  - 15.4. Fiber count
  - 15.5. Future needs
  - 15.6. Power considerations
  - 15.7. Location
- 16. Cable types
  - 16.1. Trunk
  - 16.2. Drop
  - 16.3. Aerial
  - 16.4. Underground
  - 16.5. Indoor
- 17. FTTH operations support systems
  - 17.1. Management
  - 17.2. MTBF
  - 17.3. Software
  - 17.4. Help desks
  - 17.5. Maintenance issues
- 18. Termination options
  - 18.1. Connectors
  - 18.2. Splicing techniques and equipment
  - 18.3. Five termination options/techniques

19. Network test equipment choices
  - 19.1. OSP and system level equipment
  - 19.2. Test points and equipment specifications
20. Splitter placement
  - 20.1. Types and specifications
  - 20.2. Options
21. Cabinets, vaults, hand-holes and slack cable
  - 21.1. Placement and storage
22. Practical exercises - Given various scenarios, choose the following components:
  - 22.1. Electronics (light/detector sources)
  - 22.2. Network path
  - 22.3. Passive components
  - 22.4. Assemble a bill of materials for a FTTH network
  - 22.5. Splice and test using FTTH specific tools
  - 22.6. Build an end-to-end loss budget.
  - 22.7. Build a "not to exceed" OSP loss budget for contractors
23. Glossary and acronyms

### **Estimated Length of Course and Cost**

A CFHP training course will need to be developed in order to prepare those without sufficient experience or previous education to go directly to the FTTH Council's certification examination. The CFHP course is planned for two full days of classroom instruction. Estimates from CFHP training course providers for tuition and the course manual are \$850.

### **CFHP Implementation Steps:**

The FTTH Council is working with CFHP training course providers as partners/developers for the CFHP Course development and Library of CFHP Exam Questions. Coincident with FTTH Council quarterly Member's Meetings, or at other conferences, CFHP training course providers will teach their CFHP course covering the body of knowledge outlined above.

The FTTH Council will develop an online Examination Process, and experienced professionals and students who have completed a CFHP course will take the online exam, and if they achieve a passing grade, will receive a certification diploma and will be entered into the CFHP database maintained by the FTTH Council.

To initiate the program, the FTTH Council and CFHP training course providers will develop their CFHP course and the exam content and the marketing materials for the CFHP program and the course. And, both organizations will publicize and promote the course.

CFHP training course providers will set the course price and will collect the course fees from students. They will develop the course content and manuals which will be reviewed and accredited by the FTTH Council.

CFHP training course providers and the FTTH Council will develop the content and questions for the online exams that will be administered by the FTTH Council for certification of students.

CFHP training course providers will cover all costs for development and teaching their CFHP course, including instructor, course materials, meeting room, etc.

CFHP training course providers will log students who have completed their course and this information will be provided to the FTTH Council. The Council will send links and passwords for those students to take the CFHP exam. Students will be responsible for paying a certification fee to the FTTH Council to cover the costs of administering the program..

### **CFHP Designation**

The FTTH Council will administer the Certification exams and collect the certification charge. Certification fee is estimated to cost \$150 for a three-year period. At that time, passing an additional exam will be required to maintain certification.

The Council will develop the online exam process, the database of certified professionals, the Certification payment process, and provide the physical certificates to successful examinees. And, the Council will provide feedback to those students who did not pass the exam. One free retest of the exam will be provided if necessary. Additional examinations will require a retest fee, estimated at \$50 per test.

### **Marketing**

Promotions –CFHP training course providers will be responsible for promoting their own programs. The FTTH Council will promote the CFHP Certification Program through its website, e-newsletters and announcements.

Program Development-The FTTH Council will undertake an effort to reach out to the universe of training providers and educational institutions to make them aware of the certification program and to solicit materials for review.

Conferences and Meetings – CFHP courses will be promoted at conferences and meetings applicable to the FTTH audience.

Press Release – The FTTH Council North America will announce the launch of the CFHP program several months before approved training programs and the exam are introduced. This will give the FTTH Council time to work with initial parties interested in participating in the program and to complete exam materials.

FTTH Staff Support-The FTTH Council will initially launch this initiative under the direction of the FTTH Council Technology Committee. We expect, however, if successful the FTTH Council will eventually need to hire a professional staff person or retain a contractor with professional training expertise to administer the program.